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ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item : H.1

India

# USE OF INTER-INDUSTRIES ANALYSIS IN PLANNING

By Dr. K.S. KRISHNASWAMY

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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# Use of inter-industries analysis in planning

by Dr. K. S. Krishnaswamy

## I

1. The programming technique used in India so far has in the main been a combination of the aggregative and project approaches. The frame-work for each plan is initially in terms of the social accounting concepts of national income, total investment, import surplus etc., with generalised supply and demand relationships. The operative function in these constructs is of the Harrod-Domar type, elucidating the time-path of national income in terms of assumed or target values of savings-income and capital-output ratios. These coefficients are given values on the basis partly of experience and partly of aspirations. The marginal values of these ratios derived from the arithmetic of the plans constitute, in a manner of speaking, the instrument variables. And note is taken of the qualitative objectives of distributive justice, maintenance of a federal democracy, equality of opportunity and so forth in envisaging possible terminal values of the principal magnitudes.

2. The aggregative frame-work mentioned above is, before the final version of the plan emerges, filled in with a great deal of detail. The line of approach here is via projects or schemes, which are worked out in greater or less detail by State Governments, Central Ministries, public enterprises, private business organizations and so forth. In fitting these schemes into the overall plan, certain allocations of investments and outputs are made for broad sectors such as heavy industry, transport, power, agriculture and social servics. These allocations derive from the changes in production structure considered necessary for accelerating growth. The projects or schemes are then sought to be brought within these allocations, taking into account the more obvious linkages that subsist between them. For some of the basic commodities, the resulting prognostications of supply are checked with demand forecasts based on certain 'norms' of average inputs on the production side or average requirements on the consumption side. The larger of the projects included in the sectoral programmes are assessed separately from the

cost-benefit angle. There is thus a recourse to aggregate models, commodity balancing and project analysis at different stages of plan formulation, as a result of which an investment plan emerges.

3. This process enables the planning authority to set out in considerable detail the physical programmes that correspond to the financial magnitudes incorporated in the macro-plan. But it does not ensure that at all stages of the programme, the product-mix or the investment allocation is in tune with the time-path charted out for the aggregates. In consequence, there is a certain amount of indefiniteness about the intermediate targets(1), which arises not so much from the general element of uncertainty that has to be allowed for in all plans as from inadequate specification of the inter-relationships between sectoral projections. A model which is ab ovo aggregative cannot deal with such inter-relationships for two principal reasons. In the first place, the shape and stability of the total supply and demand functions are immune to variations in the micro-functions and secondly the bulk of the transactions between "industries" (which are not amongst the final users of the national product) are ignored. If one were to speak in terms of equilibrium positions or paths, the attainment of such equilibria by the macro-system is not predicated on equilibrium conditions being satisfied in all the micro-systems.

4. As the production-structure in India becomes more diversified, these features of the national accounting type of macro model render it less adequate as a tool of economic programming. This is because the combinations of sectoral output-changes which could be consistent with a given or desired change in total output increase rapidly in number as the "industries" or "activities" become more variegated. Which of these combinations constitutes the most advantageous one in any particular context of objectives and policy constraints becomes an extremely difficult matter to decide, if the planner has only broad aggregates at his disposal. The articulation of sectoral input-output relationships enhances the scope for informed judgement in this regard, and makes it possible for the planner to take into account changes in product-mix associated with specified patterns of resources allocation. At the same time, since the national accounting relationships can be derived from the input-output matrices, there will be no difficulty in using the traditional aggregative models for the task of linking target variables with policy parameters, structural coefficients and exogenous elements in the systems. Hence the growing interest of India, as of other less developed countries, in inter-industries analysis.

II

5. Like all tools of economic analysis, inter-industry models will have to be based on strong assumptions if they are to serve as programming rather than descriptive devices.

At the very outset, we shall have to assume that the economy can be broken down into "industries", each of which has definable production and demand functions, capable of being used for projection purposes. On the produc tion side, this requires that units or activities having similar input-structures be grouped together, so that a change in their proportionate importance within the "industry" has little effect on the input-coefficients. But this does not necessarily ensure that the products of these units can be considered as perfect or close substitutes from the viewpoint of intermediate or final demand. When these products are needed in the same proportion by other industries, or by final consumers, the physical differences between the commodities do not complicate the demand projections. Indeed, if sufficient care has been exercised in defining the input-structures of all "industries" and if we assume that, with given technology, input-ratios will not change with the size of 'output' of these industries, the multiplicity of products attributable to any one of the industries creates no special problem - at least at the intermediate stage. But as long as the demands of final consumers for different commodities cannot be assumed to move in fixed proportions with a change in total income, it will be difficult to define the demand function for the "product" of an industry with a degree of precision comparable to that of its production function.

6. Because of this difficulty, the temptation is to seek both product-similarity and input-similarity in the definition of "industries". The apparent attraction of this procedure for the planner is that a series of level-constraints may be used for limiting the range of variations on the final demands side and, despite the increase in the number of sectors, operational projections may be worked out for certain specific capital and consumer goods. However, in practice, the gain that may be derived from such detailed categorization of industries is, in so far as projections are concerned, likely to be small. For one thing, the available statistical data may not permit of reliable disaggregation beyond a certain point - when e.g. there is joint production at the micro-level. For another and more important thing, the validity of projections for a sizeable period of time becomes questionable. This is because with an enlargement in the number of separate industries, the production function for each of them becomes so specific that it can be altered by even minor technological changes. The period over which the production functions of all the industries may be considered as remaining reasonably stable becomes very short and consequently any medium or long-term projections derived from them would be subject to serious error.

7. There is in the final analysis no way of eliminating the errors arising from the assumption of "given" technology and one can only seek to minimise them. As mentioned earlier

one way of minimising this error is to confine the projections to very short periods, during which technological change can be assumed to be nil or negligible. But, for the planner in under-developed countries, this relatively easy way of dealing with the problem is not of much use - since his interest generally lies in medium or long-term planning. When the industrial sectors are defined rather broadly, the production functions lose some of their specificity; and it becomes plausible to assume that minor process variations within the individual firms constituting the group can be ignored. More precisely, the presumption is that, over the projection period, such technological changes as occur within the firms in any one industry are not likely to be simultaneous and therefore do not disrupt the aggregative production function. The predictive errors are not eliminated, but are, somewhat intuitively, adjudged to be of relative unimportance to the final outcome.

8. It follows therefore that in order to use the inter-industries technique in working out their programmes, it is not necessary for under-developed countries to resort to a very elaborate break-down of industrial categories. It should also be added rightaway that one should not stop at the other extreme of operating with omnibus categories like agriculture, industry, services and so forth. The point here is that the extent of disaggregation to which each of these broad sectors should be subjected to is a matter to be decided upon by considerations of both statistical convenience and the time-horizon of planning. The need for disaggregation is likely to be greatest in those sectors where the introduction of new techniques or new products constitutes an overt aim of policy. Admittedly, the longer the programming period, the less easy will be the identification of sectors on this criterion. In seeking a workable solution, a great deal of attention will have to be given to the possibility of ordering industries in such a way that the effects of new techniques in one set on the others can be taken into account in successive periods(2).

9. The fact, however, remains that in all programming, whether short-term or long-term, the projections used have to be related to certain normative judgements. These extend not merely to the assigning of weights to individual elements in the social welfare function but also to the measure and type of technological or price changes envisaged. Consequently, whatever the pattern of disaggregation adopted, we cannot dispense with the need for adjustments in the coefficients derived from past data. This is indeed commonsense; but the practical question that arises is : how are these adjustments to be made?

10. The dynamic elements whose influence on the projections have to be explicitly recognised can broadly be grouped under the following headings : (i) technological changes; (ii) differences in gestation lags; (iii) changeability of relative prices; and (iv) effects of growth on behaviouristic parameters. In respect of all of these, their likely effects

of the coefficients of a projection model can only be decided on a more or less ad hoc, empirical basis. There will, of course, be difference in the degree to which each of these adjustments constitutes a hunch. In general, the allowances to be made for technological changes and gestation lags could be decided upon somewhat more objectively than those pertaining to relative prices or behaviouristic patterns. This is because the judgements on input-output relationships or the average gestation lag in an industry can be based on the data obtainable from the most modern units in each industry, or from technological information available in other countries. In using such short-cuts, care will of course have to be taken to ensure that the data borrowed from other countries relate to the technologies which have been, or are being, imported from abroad, and that the derived coefficients constitute a consistent matrix. But the main thing is that there exists a means for making the alterations in technical coefficients dependent on something more solid than the planner's hunch.

11. When we come to anticipating the appropriate change in relative prices or behaviour patterns, no such short-cut exists. The difficulty is compounded by the fact that, unlike the technological frame-work, the economic frame-work within which the price and behavioural adjustments take place is partly expectational and therefore capable of reacting to the very act of programming. This apart, the crucial task involved in this area is that of reducing the consumption and investment decisions of a multiplicity of units to a form which permits of predictive operations. On the consumption side, the major problem is that the consumption elasticities derived from specific budget restrictions cannot be assumed to remain constant with a change in the level or distribution of total income. Since these are, in their turn, affected by the pattern of resource allocation, it follows that all consumption elasticities cannot be taken as fixed, and input-coefficients unilaterally adjusted. If a measure of consistency in the projection is to be attained, one has to allow for the variability of consumption magnitudes, but narrow it down - either by taking small sub-periods for each of which different elasticities might be postulated, or by grouping several commodities in such a way that an Engel curve can be formulated from intertemporal or international data.

12. There is, however, one extenuating factor which should be borne in mind in assessing the difficulties of consumer demand projections. Given the premiss that, in a developing country, keeping the marginal savings-income ratio at a high level will be one of the operational objectives, there is every likelihood of certain autonomous decisions being taken with regard to consumption of commodities which may be regarded as luxuries. Consequently, it is largely in respect of the likely pattern of demand for a limited number of essential consumer goods that projections will have to be made and the output-flows adjusted. It is, of course, possible

that the basket of goods which may be considered essential will be composed differently in different periods. But, if the horizon of planning is not a very distant one, and if the initial income levels are low, the qualitative change in the basket of essential goods may not be appreicable. At relatively low levels of income, therefore, there will be limited scope for variations in the pattern of consumer demand, corresponding to a moderate change in the level of per capita income. In a country like India, for instance, the behaviour pattern of the majority of consumers is unlikely to alter very much in a five-year period, if we assume an annual increase of 3 to 4 per cent in per capita income(3). Over such a range of variation, it would be reasonable to assume that the change in the demand for, say foodstuffs, can be forecast with a fair degree of precision. But as the level of average income increases, and the accumulations of capital and technology enlarge the outputs of a variety of goods, one has to fall back, as in the case of input-coefficients, on the analogy of other countries' experiences.

13. While this may not be entirely satisfactory, it constitutes nevertheless a possible means of working out successive approximations. The problem of taking into account the behaviour pattern on the investment side does not, however, lend itself to similar treatment. This is on the assumption that not all investment-decisions are taken by the Government, and that at least some of the allocations of resources are done through the market mechanism. How the input-output flows will change over time cannot be forecast on the basis of past relationships if the physical and financial conjunctures for the private decision-making unit are very volatile. In practice, the random variations in intermediate demands attributable to this element can be ignored or arbitrarily decided if the private sector in the economy is small, or confined to the production of unessential goods. Where, however, this is not true, neither sophistication in the inter-industries model nor drawing upon international experience for developing hypotheses of empirical invariances will ensure a minimisation of arbitrary judgements in the programme.

14. In other words, the principal advantage of inter-industries analysis lies in the facility it offers for an overt recognition of the structural relationships between a more or less detailed set of physical magnitudes. Since, by and large, this structure can be considered as changing only marginally in relatively short periods, it can be used as a basis for breaking down certain aggregative targets into sectoral targets. But a whole lot of pragmatic judgements will be required in working out the linkages between these targets and the policy instruments appropriate to different stages of the programme. This is particularly true in formulating an operative programme for a mixed economy. And finally, the longer the time-horizon for planning, the greater will be the need for programming in terms of broad industrial groups.

## III

15. As mentioned at the outset, explicit inter-industries models have not yet been utilised in India for working out the five-year plans. Attempts have, however, been made - principally by the Indian Statistical Institute - to construct input-output tables for certain years from data obtainable within the country. The first of these tables was a transactions-matrix for 1950-51, with a twelve-sector break-down, supported by capital stock and import matrices. The sectors chosen were rather broad and arbitrary - such as large-scale producers goods, large-scale consumers goods, small-scale enterprises, agriculture and so forth. They also included two household sectors - urban and rural. The primitive character of the exercise was due to the extremely limited body of statistical data that was available at that time. Despite this, the preparation of this table constituted an important first step and served to enlarge the interest of both technicians and Government in this field of research.

16. Transactions tables with a 36 x 36 break-down were subsequently prepared for the years 1951-52 and 1953-54. The sector classifications in these tables were much more rational, in the sense that as much consideration as possible was given to disaggregation on the basis of similarity in input-requirements. However, the distinction between small-scale and large-scale industries was maintained - again for reasons largely of statistical convenience(4). The tables were built column by column through an analysis of the cost data of various industries. Adjustments were then made for distributive margins, import content and so forth, in order to knit the rows and columns, for outputs valued at market prices. On the final demand side, a seven-fold break-down - household consumption, public authorities' current outlays, Government capital outlays, other capital installations, exports, imports and net inventory changes - was adopted. But a good part of these estimates had a poor basis of primary data and involved the use of approximate distribution of residual quantities.

17. The pattern set in the 1953-54 table has been adopted for those constructed for 1955-56. The transactions-matrix for 1955-56, which was originally of the rank 36 x 36, has very recently been enlarged into a 48 x 48 matrix, by disaggregating some of the manufacturing industry sectors included in the original table. In addition, the primary inputs have been further elaborated with a view to distinguishing between the different sizes and types of wage income generated in the several sectors. There has as yet been no capital coefficients matrix supplementing this current-flows table. It is, however, hoped that in the next few months, the current as well as capital coefficients matrices consistent with this input-output table will be developed and used for trial projections for 1960-61, which may be checked with actuals.

18. Alongside of this, work on a somewhat more elaborate transactions-matrix has been initiated in the Planning Commission, in collaboration with the Central Statistical Organisation and various Government Ministries. A ninetyfive-sector classification of the economy has been prepared, largely on the basis of input-structures. The data being used for the construction of this table relate to the period 1959-60, and the objective is to present the transactions-flows at producers' prices. The project also involves the articulation of a capital coefficients matrix with the help of both cross-section and cross-country data. It is anticipated that by the time these matrices are ready, the trial projections based on the 1955-56 table will have been carried out, and a clearer idea obtained of the analytical model for further projections.

19. This in brief is the Indian experience in the construction of inter-industry tables so far. As regards the use that has been made of the existing input-output tables, nothing very definite can be said. Undoubtedly, some of the input-output relationships thrown up by this work has influenced the long-term projections made by the Planning Commission for identifying some of the output targets. However, much of this has been in the form of isolated projections, with no more than a rough balancing of anticipated supplies and demands. One reason for this has been the lack of uniformity between the sector classifications adopted for inter-industry tables and the classifications adopted for planning or administrative decisions. This is being sought to be remedied in the later input-output constructs. But apart from this minor matter, many of the difficulties referred to in Section II, regarding the use of inter-industry matrices for projection purposes, are present in India. Despite the rapid increase in the variety of statistical data, it will be some time before a proper ground-work can be laid -both for reliable inter-industry flow matrices and for estimation of plausible behaviouristic parameters. More than anything else, there is no body of reliable information relating to final demands of the household sector, or to the investment activities of a large part of the private sector.

20. While these gaps exist, it is clearly unrealistic to expect programming on the basis of an elaborate input-output model. However, it is equally unrealistic to ignore the possibility of applying this technique for a better enunciation of the programme for a limited range of sectors. As it happens, the priority sectors in India's five-year plans are, apart from agriculture, mainly capital or intermediate goods industries, in respect of which Government rather than the market decides the basic issues. These industries are, further closely interrelated and most liable to experience the impact of modern technology in the immediate future. It is also not difficult to adjust for the likely technological changes in these sectors - partly because of the gestation lags involved, and

partly because of the system of tied credits through which their foreign exchange expenditure is met. Under these circumstances, it seems not only possible but necessary to treat these kay sectors as forming a sub-matrix, with definable current as well as capital transactions. Initially, therefore, we may treat this sub-matrix as the operational part and derive projections upon the assumption that the bulk of random variations lie outside this set. Progressively, the rank of this sub-matrix can be raised, as the production structure becomes more diversified and the statistical bases for estimation become stronger. This is undoubtedly a cumbersome approach, in which there are no automatic checks for general consistency or for optimality. But in the present state of our knowledge of the structure of the Indian economy, and of producers' or consumers' reactions to changes in incomes, prices, taxation and so forth, there seems to be no real alternative to it.

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Note:

(1) The targets referred to here are "intermediate" in a temporal as well as a technological sense; they are functions not merely of the time-horizon and the terminal growth-rate envisaged but of the final bill of goods and the technological processes involved in producing them.

(2) If we arrange industries in decomposable groups, so that there is a one-way connection as we go down the numbered categories, it is possible to consider all technological changes within a period as occurring in industries below a certain number. The effects of these can be carried forward to the industries buying their inputs from this group in the subsequent period, and so forth. This involves, however, defining the period in a special way - in terms of the lag between the innovation-decisions in one group and the innovation-decisions in another.

(3) This is obviously tenable only when there is no major shift in income-distribution over the five-year period, in favour of the low-income groups.

(4) Apart from this, the special role accorded to development of small-scale industries in India's five-year plans might also be considered as responsible for this differentiation.

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# C O R R I G E N D U M

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**SUMMARY**

Agenda Item: H.1

India

# USE OF INTER-INDUSTRIES ANALYSIS IN PLANNING

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# Use of inter-industries analysis in planning.

By Dr. K. S. Krishnaswamy

SUMMARY

1. In India, use has been made of aggregative models, commodity balances and project analysis in the formulation of development plans. These techniques enable the planning authority to set out in considerable detail the physical programme corresponding to the financial magnitudes incorporated in the macro-plan. But, this does not ensure that at all stages of the programme, the product-mix or the investment allocation is in tune with the time-path charted out for the aggregates. With diversification of production structure, it becomes increasingly necessary to take into account changes in product-mix associated with specified patterns of resource allocation. It is in the articulation of this element that inter-industries analysis becomes a technique of interest to the under-developed countries.

2. Since the utility of the inter-industries technique in programming depends on the facility it can offer for more detailed, inter-related projections, the principal questions to be considered relate to the assumptions on which such projections have in fact to be based. At the very outset, one will have to decide the extent to which disaggregation in terms of "industries" can be attempted. If a very detailed sector-classification is adopted, the validity of related projections for a sizeable period of time becomes questionable. This is because the period over which the production-functions of all the industries may be considered as remaining reasonably stable becomes very short; consequently, any medium or long-term projections based on such unstable production-functions would be subject to serious error. When, however, the industrial sectors are defined rather broadly, the production-functions lose some of their specificity and it could plausibly be assumed that minor technological changes will not disrupt the production-functions. Therefore, in seeking a workable solution, a great deal of attention will have to be given to deciding suitable disaggregations. It is also worthwhile considering the possibility of ordering industries in such a way that the effects of new techniques in one set of industries on the others can be taken into account in successive periods.

3. However, technological changes and differences in gestation lags are not the only dynamic elements to be considered. Note will also have to be taken of the changability of relative prices as well as of the effects of growth on behaviouristic parameters. In respect of all these, the effect on the coefficients of a projection model can only be decided on a more or less ad hoc, empirical basis. To some extent, it would be possible to take account of likely technological changes and gestation lags through use of cross-country data. But, such a short-cut would be risky in regard to the changes in relative prices or behaviour patterns that may be imposed on the projections. Some other way will have to be found for reducing the consumption and investment relationships of a multiplicity of units to a form which permits of projective operations. On the consumption side, it may be possible to work in terms of small sub-periods for each of which different consumption elasticities might be postulated; or several commodities may be grouped in such a way that an Engel curve can be formulated from inter-temporal or inter-industry data. The problem of taking into account the behaviour pattern on the investment side does not, however, lend itself to similar treatment. The random variations in intermediate demands attributable to this element can be ignored only under conditions of rigid centralised planning.

4. In other words, the principal advantage of inter-industries analysis lies in the facility it offers for an overt recognition of the structural relationships between a more or less detailed set of physical magnitudes. But a whole lot of pragmatic judgements will be required in working out the linkages between these magnitudes and the policy instruments appropriate to different stages of the development programme.

5. Though explicit inter-industries models have not yet been utilised in India for working out the five-year plans, several attempts have been, and are being, made to construct well-articulated transactions-matrices for the economy. However, despite the rapid increases in the variety of statistical data, it will be some time before a proper ground-work can be laid - both for reliable inter-industry flow-matrices and for estimation of plausible behaviouristic parameters. While these gaps exist, it would be rather unrealistic to expect programming on the basis of an elaborate input-output model. On the other hand, there does exist the possibility of applying this technique for a better enunciation of the programme for a limited range of sectors. Under existing circumstances, it seems both possible and necessary to construct a sub-matrix of key-sectors, which may be treated as the operational part and projections derived on the assumption that the bulk of random variations lie outside this set. The size of this sub-matrix may be gradually increased. In the existing conditions of basic statistics, there seems to be no real alternative to this approach.



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Agenda Item: H.1

Norway

# MACROECONOMIC DECISION MODELS WITH SPECIAL EMPHASIS ON THEIR APPLICABILITY IN LESS DEVELOPED AREAS

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# Macroeconomic Decision Models

## with special emphasis on their applicability in less developed areas

By Ragnar Frisch

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0. Introduction

The development problem in less developed areas has a variety of special aspects, as listed in Part III of the United Nations' "Revised Information Bulletin" (E/CONF.39/INF.1/REV.1). These special aspects have in the past attracted considerable attention, but they need much closer study as separate branches of the development problem. One generel aspect of the problem has attracted less attention and is, in my opinion, a minimum factor in development studies today, namely a rational scientific analysis of the way in which the various special aspects gear into each other. The economic coordination problem has, as I see it, been approached in a too simple manner.

The popularity of these traditional approaches is, it seems, due more to their simplicity and therefore ease of theoretical handling than to their realistic and practical use in development policies. To be specific I may mention a few of the shortcomings of the simple approaches to the economic coordination problem.

When attention is focused on such simple concepts as the savings rate and the output-to-capital ratio and forecasts of these magnitudes, one cannot take adequately account of the very thing that is vitally important in developing areas, namely an exact comparison of the various specific investment projects that might be considered. A large number of investment projects will have to be considered and compared, taking account of all their foreseable effects, direct as well as indirect. As examples of such effects may be mentioned: (a) The timeshape of the input-needs (domestic and foreign) for the execution of each specific big investment project or specific group of smaller projects. (b) The timeshape of the increase in production capacity which will follow if and when the project or group of projects is accepted. (c) The time shape of the infra-effect, i.e. the effect which the project or group of projects may have on the current account input-coefficients or other essential coefficients. (d) The effects, direct as well as indirect, which the adoption of the project or

group of projects will have (in the construction period and in the subsequent operation period) on the flow of purchasing power to private households and therefore on private demand for consumer goods. All these aspects - and several others - of the investment activity must be taken account of explicitely and simultaneously when one is aiming at the "optimal utilization of ... resources" (p.3 of the "Revised Information Bulletin").

A current account input-output table in absolute figures based on data for previous years is very useful as a provisional description of the structure of the economy. But in a developing area where Government initiative is the key-note of the problem, it is misleading to convert such a table to a table of coefficients and in the traditional way (through a matrix inversion) to use these coefficients in order to derive the total production in each production sector from a list of final demands. This procedure is inadequate for a number of reasons. (a) It does not take account of the various capacities of production that will exist in each year within the planning horizon (these capacities are determined by the specific investment decisions made). (b) It does not take account of the infra-effect (which also depends on the specific investment decision made). (c) It does not take account of the substitution effect among different types of input (for instance the use of alternative sources of energy). (d) The final demands cannot be considered as data but must be considered as variables which, together with other variables, are to be determined through a comprehensive programming analysis.

Growth models (even if built on a sectorial break down) are inadequate. We need instead operational decision models with explicite specification of the large number of parameters that are subject to Government control and decision, for instance acceptance, postponement or rejection of specific big investment projects or specific groups of smaller projects; decisions on various current account operations such as the consumption policy for specific types of consumer goods etc.

Studies of the balanced-growth type (leading for instance to the time path nicknamed the "Turnpike")are inadequate. The very concept of "balance" can only be defined in a realistic way through a rational dynamic programming approach that includes simultaneously all the above aspects, at least in an approximate way. And if such an approach is followed, there is no need for introducing the concept of "balance".

On the basis of my theoretical studies and the experience gained during several stays in less developed countries (Egypt and India) I have attempted to work out a comprehensive scheme of optimal programming including simultaneously all the aspects mentioned above. Within the compass of the present short paper I can do nothing more than to indicate very briefly under 16 paragraphs the content of this analytical scheme.[1]

1/ The scheme is considered in some detail in my paper Preface to the Oslo Channel Model. ASEPELT, 1, 248-286. North-Holland Publishing Company, Amsterdam (1962). More details will be given in a paper to appear in the research series of Accademia Nazionale dei Lincei, Roma.

1. The difficulties and the seriousness of the problem

In underdeveloped countries that strive to achieve rapid economic progress, one is nearly always confronted with the same common pattern of difficulties and conflicting goals. To create employment and raise living standards as quickly as possible in a rapidly increasing population, one starts more or less by force all sorts of economic activities. Improvements in agriculture, industrial developments in light industries as well as in heavy industries like steel, fertilizers, electricity production etc. Since all this activity means spending lots of money, an inflationary pressure emerges with heavy drain on foreign reserves. Purchasing power in the hands of consumers is increased. Social reforms such as the redistribution of land tend in the same direction. By trying to solve one problem one creates several new problems. The whole picture is bewildering and it is hard to know precisely what course to follow. In this situation optimal programming is indispensible.

2. The nature of foreign aid

One of the worst things that can happen to an underdeveloped country is to receive foreign aid with political strings attached. But economic strings may be equally disasterous. Sometimes they are wrapped up in financial forms that are not easily discernable.

Private investments made in a developing country by a foreign company in order that this company can make a profit, has nothing to do with "aid". This, of course, does not mean that a developing country may not find it advantageous to make a contract with a foreign company, say, for the setting up of a factory or for prospecting for oil or other natural resources. This is simply an advantageous transaction similar to other trade transactions with foreign countries. The same applies to loans given on a strictly commercial basis. Real aid is something different. It consists of direct gifts (with neither political nor economic strings attached) or loans that are given on particularly favourable terms (and with no strings attached).

3. The planning model must be dynamic. The principle of moving planning. Committed - to vs. decisional elements

The planning model must be dynamic in the sense that each variable in each year in the foreseable future must be considered as a separate magnitude. And a clear distinction must be made between the magnitudes that are already committed - to through previous decisions and those that are still decisional in the sense that they depend on the particular decisions to be made in the year considered. Each year a complete new plan (say a five or seven year plan) should be worked out, taking account of new data (perhaps changed preferences) and what has now become committed -

to through last year's decisions. This is the principle of moving planning.

4. The planning model must be operational. The insufficiency of prices as instruments of planning

The planning model must be operational in the sense that it brings out explicitely the parameters that are subject to Government control and decision, as stated in the introduction. Detailed theoretical analyses as well as practical experience prove that prices are insufficient as instruments for steering the economy towards the desired constellation.

5. Planning period vs. repercussion period. The truncation effect

The planning period is the span of years (say 5 or 7) for which one considers in detail the effects of decisions. In order to reach the decisions it is, however, necessary to have an open eye also for certain economic repercussions that will follow over a longer period after the lapse of the planning period, even though these repercussions are not considered in great detail (electric power stations etc. may last perhaps 50 years or longer). This more extended period is the repercussion period. The distinction between these two periods produces a truncation effect in planning. The ensuing problem may be solved with sufficient accurancy through a suitable formulation of the preference function.

6. The selection problem vs. the implementation problem

In the selection problem one seggregates for consideration certain types of conditions that are of a particularly basic sort: Accounting relations, technical conditions of production and capital investment (including the possibility of substitution between certain kinds of input), the bounds on the variables that are due to the capacities of production in any given year, the basic laws in the consumers behavior etc. Mathematical programming is most promising when applied to the selection problem.

When the optimum timepath of the economy from the selection viewpoint is determined, one considers what kinds of specific institutional, administrative and monetary measures will be needed in order to bring about the optimum evolution of the economy (in the years under consideration). This is the implementation problem. To revert the order of these two problems is to put the cart before the horse.

7. Planning on the establishment and commodity level vs. planning in more aggregated terms

If a very detailed form of planning is desired, it will have to be done throughout on the establishment and commodity level. But this is so formidable a task, both computationally and from the viewpoint of data collection that some form of aggregation has to be made, at least for such establishments and commodities

that are not of dominating importance.

8. The preference function and the cooperation between responsible politicians and analytical experts

Any programming technique must be based on a definition of the preference function. This admittedly is a difficult problem that needs to be studied in all seriousness. During the last years I have worked so much both on the theoretical and on the practical aspects of this that I have been able to reach a rather definite opinion. I am convinced that the preference function problem for an economy at large can be solved when it is approached in an intelligent and cautious way. This opinion is based not least on extensive interviews with leading policy makers.

The preference function cannot be formulated in one stroke. It can only be done through a series of attempts based on continuous co-operation between the responsible authoriries and the analytical experts. A series of tentative solutions with different alternative formulations of the preference function (and of some of the bounds in the problem and other side conditions) is needed. Compare also paragraph 10.

9. The nature of bounds

For most of the variables we must impose lower and|or upper bounds. These bounds may be of different sorts. For instance a lower bound on the production in each production sector. Conceptually this bound is at least zero, but as a rule it will for political or other reasons be much higher. The condition that actual production in any sector shall never surpass the existing capacity leads to the introduction of a slack variable which is bounded on one side. It will as a rule be found convenient to supplement the continuous definition of the preference function by bounds on the variables in terms of which the preference function is expressed.

10. The parametric aspect of programming. The peak load on foreign indebtedness

It will be necessary to consider a lower (possibly zero) bound for investments in each given direction and also an upper bound due to the limited stockpile of products in each direction. Several solutions may be run with different values of the upper bounds to investigate the usefulness of additional project making in the various directions. Compare paragraph 15 on project guidance.

Last but not least it will be necessary - for political reasons or reasons of the foreign credit market - to impose an upper bound for the peak load of foreign indebtedness over the foreseable future. This latter bound is extremely important. Several solutions should be run, each with a different value of this bound.

The changes of bounds here considered make the programming parametric. Compare also paragraph 8.

11. Private consumer demand as determined by the flow of purchasing power from production sectors to households

The way in which this aspect of the problem is incorporated in the analysis is discussed in a number of previous papers.[2]

12. The substitution in current production inputs taken account of through input substitution rings in approximately equivalent factors

When we speak of the requirement which a certain sector, say No.k, has for a certain kind of input, we cannot in general assume that this requirement always has to be delivered from a particular one of the other sectors. This applies for instance to energy. We will assume that there may be a ring of other sectors say Nos. $\alpha, \beta \ldots \gamma$, from which the supply may come. We will assume that the individual sectors within the ring are equivalent in the sense that a definite quantity of the product of any given one of these sectors can replace a definite quantity of the product from any given one of the other delivering categories in the ring. The ring product being thus defined, we will assume that sector k has a technically well defined requirement for the ring product as a whole.

In symbols we can express these assumptions by saying that in the year t, the deliveries from the delivering categories $\alpha, \beta \ldots \gamma$ to the sector k are defined through the following ring equation

$$(12.1) \qquad \sum_{h=\alpha,\beta\ldots\gamma} x^{xrt}_{hk} x^{t}_{hk} = x'^{t}_{rk} x^{t}_{k}$$

where $x^{t}_{k}$ is total production in sector k in year t, $x^{t}_{hk}$ is the delivery from h to k in this year, the $x^{xrt}_{hk}$ are given equivalence coefficients inside the ring r and $x'^{t}_{rk}$ is the input coefficient from ring r to sector k.

From a formal viewpoint it is more convenient to extend in (12.1) the summation to all delivering categories, and simply put the equivalence coefficient $x^{xrt}_{hk}$ equal to zero for those delivering categories h that do not belong to the ring r. With this convention the ring equation can be written in the general form

$$(12.2) \qquad \sum_{h=all} x^{xrt}_{hk} x^{t}_{hk} = x'^{t}_{rk} x^{t}_{k}$$

where "all" indicates all technical delivering categories (production sectors, primary inputs and complementary imports).

For each receiving sector k there will exist a definite number of rings, each defined by a ring equation of the form (12.2)

The fixed coefficient approach with no room for substitution between input categories can be expressed as the special case of (12.2) where there is one ring

2/ Ragnar Frisch, From National Accounts to Macroeconomic Decision Models. Memorandum of 27 August 1953 from The University Institute of Economics, Oslo (also published in the series brought out by the International Association for Research in Income and Wealth). Ragnar Frisch, Main Features of the Oslo Median Model, Memorandum of 10 October 1956 from the University Institute of Economics, Oslo (also published in Russian (1961) in the series edited by academician Nemchinov)

corresponding to each delivering category, and in each such ring all the equivalence coefficients are zero except one, namely the one corresponding to the delivering category considered. This particular equivalence coefficient may then conventionally be put equal to 1. If the rings are numbered according to the delivering category in question, the equation (12.2) then reduces to

$$(12.3) \qquad x^t_{hk} = z'^t_{hk}\, x^t_k$$

which is the simple input coefficient assumption with no substitution possibility.

It is easily seen that the ring structure (12.2) will in general leave us with more degrees of freedom than the simple input coefficient assumption (12.3). For instance if for a given k (12.3) is assumed for all input categories h except three and the assumption for these three is replaced by a single ring equation, we have two more degrees of freedom than we would have had if (12.3) had been assumed for all input categories. The introduction of substitution rings does not destroy the linearity of the set up, it only increases the number of degrees of freedom.

13. Substitution effect in private consumer demand, in government current input and in geographical export directions

These effects may be handled by a similar procedure as that explained in paragraph 12. This will not destroy the linearity of the set up.

14. The investment starting

The volume of the starting in the investment channel No. g with delay d is denoted $H^d_g$. These variables are fundamental. The magnitude $H^d_g$ does not denote the investment expenses that will actually have to be incurred in the starting year, i.e. in the year d+1 (t=1 being the first year of the plan), but it indicates the total expenses (reckoned in volume figures) over all the years taken together that will be needed in order to complete the investment that is considered for starting in the year d+1. The magnitude $H^d_g$ does not express something that has happened or something that will necessarily happen, but it is a decisional parameter. We may decide to make $H^d_g$ smaller or larger, or perhaps put it equal to zero. The essence of the problem is that from our decision on the size of $H^d_g$ will follow a number of consequences that must be studied (the time shape of the input needs for completing project g, the time shape of the increase in capacities etc.). How large we should make $H^d_g$ is a problem which is part of the general programming analysis.

15. The project description. The list of projects. Project guidance

An investment project is defined through a description worked out according to a scheme with thorough specification of the data which are required to find out what the repercussions on the economy will be if and when it is decided to start the project.

The data contained in the project description can only be concerned with the repercussions that are directly visible and therefore can be given by the technicians connected with the elaboration of the project. The infinite variety of indirect repercussion will only appear when the project - with explicit formulation of the two alternatives: acceptance or rejection - has been incorporated in a decision model that has been solved by the overall planning experts.

There are four types of data to be included as direct repercussions in a project description. First the parameter $H_g^d$ that indicates the size of the project and its phasing, i.e. the year when it might be started. Second, a set of coefficients describing the carry-on-activity, i.e. the investment inputs that have to be made into the project in the course of the construction period. Third, a set of coefficients describing the effects which the project will have on the capacities of production when the fruits of the projects - if and when it is started - begin to emerge. It is essential to take account of the time shape of this capacity effect. Fourth, a set of coefficients describing the infra-effect of investments, i.e. the effect which an investment project may have on the coefficients of the model.

Details about the current account inputs and outputs that will be connected with the project during its subsequent state of operation will depend on many things that cannot be finally decided upon until after a complete and overall programming solution has been obtained (unless one is prepared to make many simplifying assumptions). Final details about current account operations can therefore not be given in the project description but special types of information about this should be given.

Rational planning at a national level can, of course, not consist simply in applying mathematical programming techniques to a decision model built on any given list of investment projects. For the possibility of obtaining a really high value of the preference function it is essential that investment projects of the right kind are available. To increase the chance of having valuable projects included in the list of projects which is taken as a datum in the mathematical programming, the planning authorities should issue ahead of time what may be called a project guidance built on what project properties have proved useful in previous complete solutions or in solutions of pilot investigations. But this being said, I want to add that it is dangerous to go too far in this direction. We must rely on the creative imagination of all layers of the whole population. And for best results the projectmakers should not be put in a Procrustean bed. Everybody should be encouraged to bring forth new ideas however wild they may look. But a collection of ideas is certainly not enough. One will need a systematic method for distinguishing between what is valuable and what is useless from the viewpoint of the preferences of the policy makers. Only scientific programming can provide such a criterion.

16. Regional planning.

In a concrete and realistic form of national planning it is impossible to disregard the regional aspect. The aims of national planning will indeed always to a smaller or larger degree be concerned with the development of certain underdeveloped parts of the country. And we have to consider the fundamental problem of an optimal development of the transportation network and the location of industry. And this in turn is connected with all sorts of micro-regional prlblems involving such questions as social layers, housing problems, shopping and entertainment centres, commuting lines between living place and working place etc.

I have no faith in a planning system where each region - defined in a more or less conventional way - is left free to submit, according to its own ideas, a suggestion for a plan - investment pland and|or plan for current account operations - within its border, attempting subsequently to "co-ordinate" these regional plans at the top level by trial and error or rounds of "iterations" by consultations between the top level and the regional authorities. For effective planning one must start by a rather definite frame to be prescribed for the subsequent detailed regional - or even enterprise - plans to be prepared at the lower levels. And this top level (necessarily aggregated) plan frame must be worked out by a simultaneous and explicit programming technique. This requires a specific definition of a pattern of theoretically interlocking centres.

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# C O R R I G E N D U M

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**SUMMARY**

Agenda Item:H.1

Norway

# MACROECONOMIC DECISION MODELS WITH SPECIAL EMPHASIS ON THEIR APPLICABILITY IN LESS DEVELOPED AREAS

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Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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# Macroeconomic Decision Models

## with special emphasis on their applicability in less developed areas

By Ragnar Frisch
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SUMMARY

The development problem in less developed areas has a variety of special aspects, as listed in Part III of the United Nations' "Revised Information Bulletin" (E/CONF.39/INF.1/REV.1). These special aspects have in the past attracted considerable attention, but they need much closer study as separate branches of the development problem. One generel aspect of the problem has attracted less attention and is, in my opinion, a minimum factor in development studies today, namely a rational scientific analysis of the way in which the various special aspects gear into each other. The economic coordination problem has, as I see it, been approached in a too simple manner.

The popularity of these traditional approaches is, it seems, due more to their simplicity and therefore ease of theoretical handling than to their realistic and practical use in development policies. To be specific I may mention a few of the shortcomings of the simple approaches to the economic coordination problem.

When attention is focused on such simple concepts as the savings rate and the output-to-capital ratio and forecasts of these magnitudes, one cannot take adequately account of the very thing that is vitally important in developing areas, namely an exact comparison of the various specific investment projects that might be considered. A large number of investment projects will have to be considered and compared, taking account of all their foreseable effects, direct as well as indirect. As examples of such effects may be mentioned: (a) The timeshape of the input-needs (domestic and foreign) for the execution of each specific big investment project or specific group of smaller projects. (b) The timeshape of the increase in production capacity which will follow if and when the project or group of projects is accepted. (c) The time shape of the infra-effect, i.e. the effect which the project or group of projects may have on the current account input-coefficients or other essential coefficients. (d) The effects, direct as well as indirect, which the adoption of the project or group of projects will have (in the construction period and in the subsequent operation period) on the flow of purchasing power to private households and therefore on private demand for consumer goods. All these aspects - and several others - of the investment activity must be taken account of explicitely and simultaneously when one is aiming at the "optimal utilization of ... resources" (p.3 of the "Revised Information Bulletin").

A current account input-output table in absolute figures based on data for previous years is very useful as a provisional description of the structure of the economy. But in a developing area where Government initiative is the key-note of the problem, it is misleading to convert such a table to a table of coefficients and in the traditional way (through a matrix inversion) to use these coefficients in order to derive the total production in each production sector from a list of final demands. This procedure is inadequate for a number of reasons. (a) It does not take account of the various capacities of production that will exist in each year within the planning horizon (these capacities are determined by the specific investment decisions made). (b) It does not take account of the infra-effect (which also depends on the specific investment decision made). (c) It does not take account of the substitution effect among different types of input (for instance the use of alternative sources of energy). (d) The final demands cannot be considered as data but must be considered as variables which, together with other variables, are to be determined through a comprehensive programming analysis.

Growth models (even if built on a sectorial break down) are inadequate. We need instead operational decision models with explicite specification of the large number of parameters that are subject to Government control and decision, for instance acceptance, postponement or rejection of specific big investment projects or specific groups of smaller projects; decisions on various current account operations such as the consumption policy for specific types of consumer goods etc.

Studies of the balanced-growth type (leading for instance to the time path nicknamed the "Turnpike")are inadequate. The very concept of "balance" can only be defined in a realistic way through a rational dynamic programming approach that includes simultaneously all the above aspects, at least in an approximate way. And if such an approach is followed, there is no need for introducing the concept of "balance".

On the basis of my theoretical studies and the experience gained during several stays in less developed countries (Egypt and India) I have attempted to work out a comprehensive scheme of optimal programming including simultaneously all the aspects mentioned above. Within the compass of the present short paper I can do nothing more than to indicate very briefly under 16 paragraphs the content of this analytical scheme.[1]

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Agenda Item : H

Poland

# PLANNING IN AN IMPORT-SENSITIVE ECONOMY

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# PLANNING IN AN IMPORT - SENSITIVE ECONOMY

by Ignacy Sachs, Ph.D.

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1. The developing countries, taken as a whole, are facing a severe "trade gap": the average annual rate of growth of their exports has been lagging far behind the rate of expansion of imports. During the years 1953-60 the developing countries increased their imports at a rate of 5.5 per cent per annum, i.e. faster than the growth of national income, which may be put at 3.5-4 per cent, while exports hardly kept pace with the national income, faring 3.5. per cent per annum. Exports from developing countries cover at present only about 90 per cent of their imports, leaving an uncovered gap of 10 per cent of merchandise imports without mentioning the heavy deficit on the remaining posts of the balance of payments.

1.1. Such a situation arises fundamentally from the combined effect of two factors:

/i/ the lack of sufficient demand on the world capitalist market for several traditional export-goods produced by the developing countries, which accounts also for the adverse trend in the terms of trade, and

/ii/ the mounting pressure on the import bill of developing countries, on account of development programmes as well as of unsatisfactory internal supply of food and fuels, magnified by the high rates of population increase.
It should be noted that up to now no significant transfers of capital from the developed to the less developed countries have taken place: the so-called "net flow of long - term capitals" /which includes also re-ploughing of profits made by foreign companies/ hardly matches the outflow of capital from the less developed countries in form of expatriated profits of foreign capitalists, losses suffered on account of adverse terms of trade and placements made by capitalists from underdeveloped countries in banks abroad.

1.2. The situation described above has all the features of a structural inbalance. The traditional division of labour, evolved in the past century, proved to be a trap for the former colonial and dependent countries. They were forced into a narrow specialization, which made them heavily dependent on foreign trade in primary commodities. Such a trade never really succeeded to play the role of an "engine of growth". At best it lead to phases of lopsided development, alternated with periods of depression and crisis. Theoretically, during the years of plenty, imports of capital goods could have been

stepped up and industrialization carried over, but the relative abundance of foreign currency would rather induce the ruling elites to spend lavishly on luxury goods or to invest in the expansion of monocultures for export, thus paving the way to future crisis of overproduction, which were to hit them back through the price effect. Now that those countries are facing an unelastic world demand for their traditional exports, the need for industrialization has a much wider appeal, but foreign currency to pay for imports of capital goods is in short supply. Thus former "export-economies" /with the exception of a handful of producers of oil and some strategical materials, which are not of our concern in this paper/ became "import-sensitive economies". Industrialization is the only effective answer to their problems, as we shall see, and the only way to break through the strait-jacket of the unilateral division of labour, which has been forced upon them. But to achieve it, they have to start by increasing imports of capital goods; the foreign currency shortage becomes thus the most dangerous bottleneck, slowing down the overall rate of growth. The whole strategy of development must be subordinated to ease this bottleneck.

2. The planner has first to consider all the possibilities of increasing the earnings from exports.

2.1. We shall assume the existence either of stocks or of unitilized production capacity within the range of goods traditionnally exported. An export drive will not require therefore additional investment as long as the commodity pattern of exports remains unchanged. But ex definitione /we are speaking of import-sensitive economies / the demand on the world market is inelastic. Two possibilities must be examined however:

2.1.1. Even if the demand is inelastic, it is still possible to increase the volume of sales in the traditional markets by reducing the unit-price. This operation cannot be carried, however, beyond the point when the losses on unit price are bigger than the earnings obtained through the increase of the volume of sales. For a wide gamut of goods produced by less developed countries the actual market situation is such that it is preferable to protect the level of prices and renounce bigger sales, rather than to step up sales by depressing prices still more.

2.1.2. Some scope for increasing traditional exports exists by making headway into new markets. This is particularly true of the socialist countries. The trade between the socialist countries and the developing ones has been expanding at a rate of about 10 per cent per year during the years 1957-60, but it started some years ago almost from nil, so that the share of the socialist countries in the trade of the less developed countries does not exceed as yet 5 per cent. As for the intensification of commercial exchanges within the area of less developed countries themselves, it is bound to grow mainly in the field of non-traditional goods; the striking parallelism of production pattern in many less developed countries does not offer much room for an expanding mutual trade in traditionally exported primary goods. On the whole, the possibilities of immediate expansion on new markets with traditional export goods, though very commendable as it does not require special investments, are rather limited.

2.1.3. Some gains can be obtained by taking proper organizational steps, namely by establishing an effective state monopoly for sales

of main export products. Such a measure - when properly executed - strengthens the bargaining power of the exporter, makes easier the framing of long-range policies and the coordination of the foreign trade sector with the rest of the economy. In particular, the utilization of trade profits as a source of capital formation, or the granting of subsidies to exports, whatever the case may be, are made easier if exports /and for this case also imports/ are operated through State monopoly.

2.1.4. Finally mention should be made of some measures of international coordination and planning. Developing countries are vitally interested in the stabilization of prices for primary goods /strictly speaking of the stabilization of their ratio to industrial prices, i.e. of terms of trade/. But up to now all the multilateral schemes proved rather deceptive, as the leading industrial powers and the big monopolies feel very reluctant in giving up the profits made by manipulating the primary commodities prices. As for the so called compensatory financing schemes, they do not offer any protection against a long-run falling trend in primary prices. While efforts to make some progress in this field should not be abandoned, in the shorter run developing countries still have a less spectacular, but quite effective means of achieving some degree of stabilization and planning in the realm of exports of primary goods, by entering into long-term bilateral agreements and contracts. When combined with imports of capital goods on a credit basis, such agreements and contracts provide a very useful framework for the operation of foreign trade within a development plan.

2.2. We can now glance at the case for exports of non-traditional goods. We shall assume, for sake of simplicity, that they require investment, as no free capacity is available.

2.2.1. The capital available for investments in an underdeveloped economy being limited, the allocation of funds to an export-oriented project reduces the scope of investment oriented towards import-substitution. While no fixed rules can be drawn, it would seem that in equality of conditions /e.g. same gestation period, identical capital-output ratio and equivalent foreign-currency effect/ an import-substituting schema should be preferred to an export-oriented one, as it strengthens the economic independence of the country, while the export-oriented project, on the contrary, increases its dependence on the fluctuations of prices and volume of trade on foreign markets.

This observation should not be understood, however, as a plea for autarchy. We are discussing the case of an "import-sensitive economy", which struggles against difficulties in foreign trade so that it is bound to reduce its degree of dependence on it, while exploring to the outmost limit all the rational possibilities still open in that field. Moreover, in practice many export-oriented projects will prove more economical than alternative import-saving ones and then the choice will be obvious.

2.3.2. The probable <u>net</u> impact of an export-oriented project on the balance of payments should be carefully examined. Many mining investments, carried out by foreign private companies, prove e.g. self-defeating in this respect, as after having paid for the imports required by the company and its foreign staff and the profits expatriated by it, hardly any foreign currency is left for the exporting country. Once more one should point in this connection to the pat-

tern of trade referred to above in /2.1.4./: a mine equipped with foreign machinery imported on credit and repaid through deliveries of part of the current output of the mine, agreed upon in a long-term contract, might prove a very satisfactory deal to the developing country, mostly so if the newly extracted mineral was in short supply on the local market.

2.3.3. The scope for opening new quick-profit yielding lines of primary production for export being limited in the majority of countries by the availability of natural resources "easy" to explore and by the huge amount of necessary investment, the question arises to what extent developing countries could turn their attention to the production of industrial goods for export.
Prima facie such a goal should rather follow than precede the implantation of import-substituting industry. But several exceptions should be made:

/i/ in the case of a very small and rather backward country the dimensions of the internal market are so tiny that no modern industrial plant could be set, without engaging in selling part of its output on foreign markets. This calls for a close coordination between the developing countries of their blueprints for industrialization: the future of regional "common markets" in Latin America, Africa and Asia /or perhaps of broader schemes of economic co-operation between developing countries of different geographical areas /depends on the ability of the countries interested to find ways of establishing an effective international division of industrial labour, while mere taking of commercial measures, reducing or abolishing of customs tariffs etc. will not do;

/ii/ a few large developing countries, already engaged in a drive to build on their territory heavy industries may find it easier, for reasons of economies of scale, to plan from the very beginning plants with an output capacity exceeding the current demands of the local market, and turn at an early stage of industrialization to experts of heavy industrial products. Such a solution, perfectly legitimate from the point of view of these future industrial "giants" again requires careful international planning and close economic association between developing countries;

/III/ many hopes are voiced about the possibility of rapid expansion of experts of the so-called "cheap labour goods" from the developing countries to the highly industrialized ones. It would seem, however, that such possibilities have been greatly overstimated. The textile and the light engineering goods industrial are mushrooming all over the world in spite of excess capacity already existing both in developed and underdeveloped countries and there is hardly any room left for new Japans in the present international division of labour. On the other hand, one has to take a very careful view of the import-content of exported industrial goods. It may so happen e.g. that engineering goods shipped abroad and exchanged for non-essential goods, have a high import content paid for in hard currency; in such a case part of the non-essential imports is actually paid for in hard currency.

2.4. The cursory examination of export possibilities made above leads to the conclusion that for the great majority of "import sensitive economies" they are quite limited in the realm of primary

goods and, in the short and medium run, also in the field of industrial goods /except perhaps for substituting semi-processed materials for raw materials, e.g. pressing oil and selling oil and deoiled cakes instead of oil seeds/. This calls for a realistic and cautious assessment of the targets for increasing exports.

3. Once all the possibilities of increasing exports have been taken into consideration and capacity to import evaluated, the only way of increasing the overall rate of growth of an economy consists in reducing as much as possible the import co-efficient. Actually, it becomes a major criterion of evaluation for the planner, who has to frame the developmental plan in such a way as to achieve a fair measure of import substitution.

3.1. At this stage we should once more turn to organizational aspects of the problem and point to the necessity of establishing strict controls of imports /preferably through State monopoly of foreign trade/ in order to simply eliminate unessential imports of luxury-goods /the range of items banned from import lists being defined according to the standards of living of the working population and the capacity of the country to import/. Unessential imports constitute, however, for the planner a "reserve" which can only be used once.

3.2. Besides observing the rules of extreme austerity in imports of unessential goods, rigorous screening of all investment projects is called for, having in view:

/i/ the choice, ceteris paribus, of the project with the lesser foreign component. It is even admissible to increase the actual cost of the project, if effective cuts in imports are within sight. E.g. a country with unlimited supply of labour should choose traditional techniques of road construction rather than to import expensive road building machines. But considerations of shortening the gestation period of the investment may arise and on the other hand, the scarcity of wage-goods /foodgrains/ may put a check to the policy of increasing national income through extensive /and import-substituting/ employment of local labour[x]

/ii/ anti-import biased technological processes should be just the same preferred and local raw materials and skills utilized whenever available. In a longer and dynamic view, the reduction of the import coefficient implies, however, a sustained effort to create and expand the capacity of an economy for import substitution.

3.3. We shall first look at the possibility of achieving import substitution in different categories of goods imported.

3.3.1. For several underdeveloped countries food is a major item of imports. While it is possible to ban without any serious consequence the imports of spirits, expensive canned products etc. /the alternative being to put on them prohibitive duties/, imports of grain cannot be avoided as long as local agriculture is unable to meet the barest needs of the population. The lower is the economic condition of a country and the higher the income - elasticity of demand for grain; this elasticity can be put in many cases in the range of 0,6 - 0,8; the setting of an overall rate of growth of 5

[x] If there is not enough grain to meet the expanding purchasing power in workers hands, the country will run an inflation and real wages will decrease.

per cent per year implies that supplies of grain should increase therefore at 3.5 to 4 per cent year, if inflation is to be avoided. The rate of growth of grain production should be still higher if imports are to be eliminated at the same time.

Thus import substitution of grains is but an aspect of a broader problem, viz. that of achieving a fair rate of progress in agriculture and co-ordinating the rates of growth of the industry and of the whole economy with those of agriculture. Without going into this subject, we shall limit ourselves to remark that for a great number of developing countries this is the most difficult problem and that a deficient agriculture, hampered by obsolete institutional conditions, proves often to be the most serious bottleneck, jeopardizing the industrial drive and the whole developmental process.

3.3.2. Fuel resources are very unevenly distributed over the surface of the earth; while some of the developing countries are leading exporters of oil, others lack it /at least up to now production has not been started/ and import substitution in this particular field requires important pro-investment activities and afterwards huge investment with a relatively long period of gestation. No immediate import substitution is therefore possible, but several measures can be envisaged:

/i/ a proper commercial policy aimed at reducing the monopolistic position of the big oil-companies, may be instrumental in reducing the unit-price paid for oil;

/ii/ in some countries it might be advisable to start refineries, even if local oil is not as yet available;

/iii/ in countries with short supply of oil careful attention should be given to the proper choice of means of transport. In any case, imports of motor-cars for private use should be restricted /they certainly should fall under the category of luxury imports in many countries/.

3.3.3. Industrial consumer goods offer the broadest scope for a relatively quick import substitution, and therefore, should find a place of pride in the initial five-year plans of many developing countries. The planner should, on one hand, provide for "maintenance imports of raw materials and spare parts necessary for the existing industries often having iddle capacities and, on the other,for investments in light industries, yielding a high import-substitution effect, and relatively easy to master from the technical point of view. Three pitfalls should be avoided, however:

/i/ While collaboration with foreign firms might be considered as a transitory stage from assembling to setting into motion of the complete production, it is necessary to establish a rigorous time-table for the nationalization of the production; otherwise the cost of foreign components, the royalties paid to the foreign firms and the profits expatriated by foreign associates might well nullify the whole import substitution effect of the investment. The import substitution effect should be evaluated in terms of prices prevai-

vailing in international markets[x]

/ii/ if import-substitution concerns unessential goods /considered as luxury goods at the given stage of development of a given country/ this effect is purely apparent but not real. The setting of a factory turning out luxury goods leads to "immiserizing growth", which hampers economic development instead of promoting it, in spite of the fact that industrial output and employment go up: excessive employment in the production of superfluous goods may be assimilated with employment in domestic services for the elites, increasing the demnad for food and wage-goods without contributing an useful equivalent for, it while the supply of scarce capital goods, building materials, as well as raw materials prevents their utilization in a more productive way and slows down the rate of growth of essential industries. This is a phenomenon quite common in developing countries and should be paid careful attention by the planner;

/iii/ The emphasis in the first five-year plans on consumer goods industries bringing a quick improvement of the balance of trade should not be assimilated to a long-run strategy of development, perpetuating the dependence of developing countries on the heavy industries of leading economic powers. Such an attitude would amount to accept a new pattern of unequal economic relations between the fully and the uncompletely industrialized countries, as a substitute for the colonial pattern of relations between the industrial powers and the primary goods producers.

3.3.4. In the long run, continuous and effective reduction of import coefficient depends on the ability of a country to set up its own industry of producer goods. Only a strong capital goods industry, mainly machine-building industry and still more so machine-building industry turning out machines to build other machines - makes the rate of investment /and therefore of economic development/ relatively independent from the contingencies of world market. Thus considerations of balance of payment, besides those of employment, economic independence etc. give powerful support to the view that industrialization, as complete as possible, offers the only lasting solution to the problems of underdevelopment. Laying of foundations or expansion of producer goods industries should therefore be envisaged in any developmental plan, while the choice and the timing of different projects should be made dependent on such considerations like the size of the country, its natural enfowments, the degree of development of productive forces already achieved, the availability of skilled and semiskilled labour etc. Generally speaking certain big countries should engage as soon as possible in an intensive drive towards large-scale machine manufacturing, and whenever natural conditions are suitable towards production of iron and steel, while smaller countries with large supply of labour could well start by

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[x] The technique, currently adopted in several countries, of measuring the import-substitution effect by the share of value added domestically in the price ex factory is misleading: if a car assembled in a given country is "fifty per cent national", but its price ex factory is twice the CIF price of the same car imported, the import-substitution effect is nil.

setting certain machine - industries. The sequence of different projects should be carefully weighed. For instance, machine-tools industries should rather proceed than follow automobile plants etc.

3.4. A mixed strategy is thus necessary for the allocation of the import capacity and the setting of the investment programme, aimed at import-substitution. The planner has to recommend imports of raw materials, spare parts and certain single machine items for the existing industries working beyond full capacity and thus achieve immediate and real import-substitution effects, if the industries concerned do not turn out luxury goods. But this is a reserve which can /and certainly should/ be used once. If such industries of essential consumer goods do not exist as yet, they should be started in close relationship with the study of the changing pattern of consumption. It should be borne in mind, however, that after a period of five to ten years, the possibilities of achieving substantial import-substitution in the range of consumer goods will be nearing exhaustion, while the increasing rate of investments, /which start from a very low point/, coupled with the inexistence of capital goods industries gives continuous and expanding scope for import-substitution in the realm of producer goods[x].
Most certainly the planner will be shifting emphasis from one goal to another as the plan progresses and attaching different "weights" to them, according to the size and the potentialities of the country as well as to the degree of acuteness of foreign currency shortages. The alternatives he is concerned with, are but a specific case of the choice between higher immediate consumption at the expenses of the long-range rate of growth, and higher future consumption made possible through a higher rate of investments in the time-horizon envisaged by the plan. But the consideration of import-substitution provides another relevant dimension, aplicable also to the choice between two projects which in a closed economy would be identical from the point of view of short and long range effects on the national income. In an "import-sensitive" economy a project bringing more import substitution should be ceteris paribus always preferred.

3.5. The argument of comperative costs is frequently invoked in attempts to dismiss the case for import-substitution and, for that matter, the industrialization of developing countries. Such an attitude is based on two misconceptions:

/1/ the whole doctrine of comparative costs is static in its very essence. It fails to take a dynamic view of a country s endowments and also of costs of production. How can we speak of comparative advantages with relation to developing countries, if the bulk of their natural resources still lies iddle or is even unknown. Going back to the example quoted in /3.3.3./ it might so happen that the

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[x] In a closed economy, the rate of growth depends ultimately on the ability of building machines to build machines. In an expanding economy, faced by foreign trade difficulties, the rate of growth will increasingly depend on the ability of stepping up investments without increasing capital goods imports.

cost of production a given item is to-day twice as high in a factory just set in Africa, as in Western Europe, but to-morrow this gap may diminish or even disappear;

/ii/ besides, the argument of comparative costs may be applied as a criterion for short-run choice only to the extent to which the primary producer faces an elastic demand on world market for its traditional export goods, and this condition does not hold true, as we have seen, for the "import - sensitive economies".
There is no point, for the group of coffee - experting countries[x] to ascertain whether it would be more economical to increase coffee exports and to buy more machinery or to start to produce that machinery. An increased offer of coffee on the world market would depress still more the coffee prices, while the average costs of production could even increase by bringing under cultivation less fertil grounds.
The real choice is therefore: to start to produce machinery even at a high initial cost[xx] or to reduce the rate of investment even beyond the rate of savings by lack of available capital goods on the market. For an "import-sensitive economy" the consideration of absolute marginal cost of production of essential import-substituting goods /and of export goods/ becomes secondary to that of availability of those goods /provided of course that they are obtained at the lowest possible cost under given circumstances/.

4. The main conclusions emerging from this paper may be summed as follows:

/i/ For an "import-sensitive economy", where the lack of foreign currency limits the essential imports and indirectly the overall rate of growth, promotion of import-substitution becomes a major goal to be pursued by the planner. The lower the overall import coefficient the higher becomes the rate of growth compatible with a given import -capacity.

/ii/ The situation is somewhat analogous to that of capital - output ratios; by lowering them by means of relying on social effort, utilizing within certain limits traditional techniques, shortening of the gestation period, reducing the volume of construction by simplifying building structures, etc. it is possible to achieve a higher rate of investment with a given amount of capital.

/iii/ While it is common practice among planners to fix import coef-

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[x] The argument presented by us does not hold true for the utterly unrealistic case of an isolated action by a single and small producer. A sharp increase of coffee production by a marginal producer. A sharp increase of coffee production by a marginal producer would not affect the world prices and would give him some temperary advantage.

[xx] There is no reason why, on the long run, the costs of machine building industries should differ significantly from country to country. The concept of comparative advantage applies in the long run only to such industries like e.g. iron and steel where costs depend on the proximity of the sources of raw materials and considerations of costs of transportation assume paramount importance.

ficients just like the capital output ratios and to use them as constant parameters in models of growth, the methodological approach should be reversed: rather than to accept the import coefficients on basis of previous experience, international comparisons etc. their maximum reduction should be sought forsand erected into a criterion of evaluation of the plan, as well as of current economic policies.

/iv/ In an "import-sensitive economy" all the major bottlenecks of growth reflect themselves in the foreign trade position and, reciprocally, the lack of sufficient import capacity sharpens all contradictions of the economy. A careful consideration of the foreign trade implications of the proposed path of development, besides the direct indications for the investment programme, the organization of foreign trade and the trade polices, provides an opportunity for a cross-examination of the soundness of the whole plan.



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FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

**SUMMARY**

Agenda Item : H

Poland

# PLANNING IN AN IMPORT : SENSITIVE ECONOMY

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on Underdeveloped Economies, Warsaw

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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# P L A N N I N G  I N  A N  I M P O R T - S E N S I T I V E  E C O N O M Y

by Ignacy Sachs, Ph.D.

Acting Director, Center of Research

on Underdeveloped Economies, Warsaw

## S u m m a r y

1. The paper describes the structural unbalance of the international division of labour between the underdeveloped and the industrial countries. Former "export economies" caught in the trap of unilateral and excessive export specialization became "import-sensitive" on account of lack of sufficient demand on the world capitalist market for their traditional exports, coupled with pressing import needs. For the majority of developing countries the foreign currency shortage becomes the most dangerous bottleneck slowing down the everall rate of growth. The whole strategy of development must be subordinated to the task of easing this bottleneck.

2. The ways of increasing traditional as well as nontraditional exports are examined by means of price reduction, drive for new geographical markets, proper organizational measures, international planning and proper choice of investments. On the whole, targets for increasing exports call for a realistic and cautious assessment.

3. Once all the possibilities of increasing exports have been taken into consideration, the only way of increasing the overall rate of growth of an economy consists in reducing as much as possible the import - coefficient. The paper recomends three sets of measures: a policy of austerity as far as current imports are concerned, choice of investment projects with smaller foreign component and an integrated policy of achieving import-substitution mostly through industrialisation. In the long-run, continuous and effective reduction of import coefficient depends on the ability of a country to set up its own industry of producer goods, mainly machine building industry; other considerations prevail, however, in the shorter - run and a mixed strategy is called for both in the allocation of the import capacity and the setting of the investment programme, aimed at import-substitution.The paper discusses at some length the ways of achieving effective import osubstitution by utilizing iddle capacities of the existing industries and the expansion of consumer goods industries /with

the exception of these turning out luxury goods/. The criterion of comparative costs, invoked frequently as an argument against the industrialization on underdeveloped countries, is dismissed due to its fundamentally static character as well as to its implied assumption of an elastic world demand for the primary goods, produced by the developing countries . For an "import-sensitive economy" the real choice is to start to produce machinery even at a high initial cost or to reduce the rate of investment even beyond the rate of savings by lack of available capital goods on the market. The consideration of absolute marginal cost of production of essential import-substituting goods /and of export goods/ becomes secondary to that of availability of these goods /provided they are obtained at the lowest possible cost under given circumstances/.

4. The following conclusions are emphasized:

/i/ In an "import-sensitive economy" import-substitution is a major goal to be pursued by the planner. The lower the overall import coefficient, the higher becomes the rate of growth compatible with a given import-capacity;

/ii/ The situation is somewhat analogous to that of capitaloutput ratios: by proper policies it is possible to lower them to achieve thus a higher rate of investment with a given amount of capital;

/iii/ Instead of fixing import coefficients and use them as constant parameters in models of growth, the methodological approach should be reversed: rather than to accept the import coefficients on basis of previous experience, international comparisons etc., their maximum reduction should be sought for and erected into a criterion of evaluation of the plan, as well as of current economic policies;

/iv/ In an "import-sensitive economy" all the major bottlenecks reflect themselves in the foreign trade and, resiprocally, the lack of sufficient import capacity sharpens all the contradictions of the economy. A careful consideration of the foreign trade implications of the proposed path of development provides an opportunity for a cross-examination of the soundness of the whole plan.



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Israel

# AGRICULTURAL AND RURAL PLANNING : ITS ORGANIZATION AND IMPLEMENTATION

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# AGRICULTURAL AND RURAL PLANNING: ITS ORGANIZATION AND IMPLEMENTATION

Raanan Weitz, Ph.D. Agriculture, Director-General, Agricultural Settlement Department, Jewish Agency, Israel.

Agriculture is at present undergoing dynamic changes not only in the developed, but perhaps chiefly in the developing countries. A rapid rise in the standard of living - so highly necessary for most of humanity - depends both on industrial development and on increased agricultural efficiency. The experience of the western countries, however, has shown this process to be fraught with the danger that the traditional foundations of rural society become undermined. So far industrial development has been centered mainly in the larger cities, which by attracting manpower from the countryside has given rise to the well-known phenomenon of rural exodus. The villagers, uprooted from their social, family and traditional environment, tend to become an unsettled element in the town, while the rural areas are depleted of the active human element so vital to their progress and development. A fundamental remedy is urgently required.

Agricultural development plans at a national level frequently engender a discrepancy between the objectives of the national policy-makers and the effective possibilities of the production units, i.e. the farms. This leads to various legislative and administrative measures, overtly aimed at development, but in fact hampering the channelling of the economic efforts towards a clear and well-defined goal. The free interplay of the market can no longer serve as the sole regulator and as a main incentive for economic progress. Accordingly the need has arisen for a method of agricultural and rural planning, within the scope of overall national economic planning, through prior assessment and adjustment of the social, organisational and political changes involved. We are presenting here an outline of some of the experience acquired in this field in Israel.

## The nature and scope of comprehensive rural planning

Economic planning, when applied to agriculture, means laying down the principles and framework for government policy, creating conditions in all fields of agricultural production which render the production desired by the state also worth while to the individual farmer. In order to be able to interpret all the factors conducive to the creation of such conditions, the comprehensive planner must deal with a variety of projections and determine suitable ways and means for changing the projected conditions in a certain predetermined direction, in line with basic state policy. This applies not only to the economic sphere, but also, and sometimes principally, to social, organisational and ideological problems. The comprehensive planner must arrive at the determination, analysis and formulation of three sets of systems. The first - macro-planning - the allocation of the means of production among the various agricultural branches so as to arrive at

the most suitable alternative under the prevailing general economic conditions; the second - micro-planning - the distribution of the additional means of production among the different settlements and farmers, so that the average income of the rural breadwinner should not lag behind the projected changes in the national average per capita income; and the third - coordination of relations between town and country, i.e. the appropriate integration of agriculture, industry and services within the rural areas so that the social, economic and cultural balance be maintained between urban and rural development and to prevent the depletion of the rural areas.

These three systems are indistinguishable in reality, and the separation is made solely for the sake of easier analysis and research. This inevitable simplification harbours certain dangers if its artificial nature is not kept constantly in mind. As fully proven by experience in Israel, more serious errors are likely to result from ignoring the overall picture than from any inaccuracies in the analysis of the different factors.

Macro-planning

The agricultural planner, when working on a national scale, has four main goals.

In the first line he must assess the envisaged development of the entire national economy so as to arrive at a harmonious integration of the agricultural sector in such planning. He must know the estimated increase in population, the annual increase of the national product, the increase of the average per capita income, and hence the annual rate of increase per capita consumption. In particular he must know the projected rate of industrial development as compared with that of agriculture.

Secondly, he must assess the factors determining the demand of agricultural products, i.e. the estimated increase in demand on the internal market, foreign market prospects and the estimated prices of agricultural produce.

Thirdly, he must assess the factors determining the supply of agricultural produce. These include a survey of basic natural resources (soil, water, climate), an estimate of the progress of agricultural know-how as reflected in increased yields, and the introduction of new agro-technical methods and prospects of enhanced productivity of labour.

Among these factors we must specially stress the great importance of the human factor, whose decisive role in agriculture is not always recognized. Experience in Israel has proved this factor to override in importance any professional agricultural aspects. Its impact in agricultural processes is more marked than in any other economic sphere because farming is more than just a source of livelihood. It is also a way of life. Agricultural development thus involves the maintenance of a stable community with a way of life of its own, for without such a stable community, adaptable to changing conditions, no economic progress is feasible. Agriculture differs from other spheres in view of the cardinal role played by the farmer's own initiative. This is particularly true of the family farm, which constitutes

has been elaborated, based on different land areas, quantities of water, capital investment and production quotas, but with equal average prospects to obtain a uniform net income. This technique is of particular importance in periods of rapid transition from subsistence farming to diversified farming or from diversified farming to specialised farming. It provides the planner with an adequate tool for achieving a fair distribution of the development effort between agriculture and other forms of economic activity and among the individual farmers, and constitutes a direct and logical link between macro- and micro-planning.

Agriculture in Israel during the last decade has taken a sharp turn from diversified farming to specialised farming, based on family farms with a minimum number of branches of economic size whose structure is determined by the special conditions of the region. Micro-planning in Israel is based on four main farm-types, namely the dairy farm, the citrus farm, the field-crop farm, and lately also the specialised export farm. From these models are derived secondary types according to regions, and with their aid the government is able to attain the required equilibrium between macro- and micro-development.

Comprehensive planning

The combination of the above systems determine the comprehensive rural planning requirements which must be considered with a view to maintaining a certain balance between agriculture, industry and services so as to preserve the social stability of the rural areas. Experience has shown the need for integrating industry in rural areas, for the following reasons:

1. In order to transfer the surplus of man-power to industries close to their homes so as to prevent mass emigration to the city; this requirement is of special importance in patriachal-traditional societies.

2. The establishment of industries in rural areas will provide markets for agricultural produce within the rural area. Instead of transporting agricultural produce over a great distance to the city, at least part of it can be sold in the nearby industrial centres.

3. In order to reduce the costs of agricultural production by saving on the transportation costs of the produce. The sugar industry may serve as an example: The cost of transporting sugar-beet from field to factory and reconveying the pulp to the farmers is a major item in sugar-manufacturing costs, which will become lower the closer the plant is situated to the field. Of course, other factors must be taken into account in determining the site and size of such a plant, on which depend the direct expenses of the industrial process. It should, however, be stressed that in estimating the profitability of establishing an industrial enterprise, industrial profitability as such is no sufficient indication. Sometimes its establishment may serve as an impetus to arouse hitherto dorman forces in agriculture, leading to new kinds of agricultural activity which would otherwise have stood no chance in that particular region. Again, only an all-round programme calculated, evaluated and tested by comprehensive planning methods, should be applied.

4. In order to make efficient use of the labour force of the farmer's family during "low periods". This problem is particularly acute in marginal areas where during certain seasons agriculture fails to provide a full employment income to the farmer. The farms in the Judean Mountain

Region in Israel may serve as an example. This region has many limitations: the areas suited for profitable cultivation are scattered and limited; water is expensive, the number of suitable crops is small and these require a large labour input during short periods, followed by so-called "dead seasons". Comprehensive planning has recently led to a proposal which seems capable of providing at least a possible solution: a regional village organisation will ensure - that, during peak agricultural seasons (in this case in summer), the rural labour forces will be supplied from outside to carry out all the required work, while during the low season (in winter) the farmer will be provided with a source of permanent employment outside his farm. One of the farm-types proposed for this area is based mainly on tobacco-growing and sheep-raising. In July-August the work-load on such a farm will necessitate input of outside labour. From October until February, on the other hand, the farm family will be free for outside work. It is therefore proposed to set up an industrial enterprise in the region where the main work will be carried out during the winter season. In this particular case, it was proposed to set up a central depot for sorting, fermenting and packing of tobacco, to absorb the entire tobacco harvest of the area and provide seasonal employment for the farmers in winter. In summer, the enterprise will release its regular labourers to work on the farms.

A second prerequisite of comprehensive rural planning concerns the development and location of the educational and economic services, because (a) the social needs of the rural population require a higher cultural and educational standard and the creation of a gap between town and country must be avoided; (b) suitable conditions must be created in the rural areas to prevent the defection of those who have acquired education and know-how and are able to serve as the activating and guiding elements so badly needed in modern rural development. These conditions might be suitable even for attracting professional personnel from outside the rural areas and may form an adequate base for the development team as explained later. Experience in Israel has proved that this is feasible; (c) suitable conditions must be created to develop economic institutions, e.g. for sorting, packing and processing of agricultural produce, regional tractor stations, and adequate but not over-costly purchasing, sales and credit services.

All these require a new approach to rural development planning, especially in the developing countries. As we have seen, such planning requires integration of agriculture, industry and the services within well-defined regions, while the study of the interaction of these factors from the social, economic, organisational, environmental and political aspect must be intensified and deepened.

One of the solutions evolved in Israel in the described direction is the "composite rural structure", consisting of a number of villages linked to one rural centre. This contains the various services and the required industrial plants. A number of such composite communities constitute a development zone, with a township at its centre. This urban centre differs from the rural centre in that it includes institutions and industrial enterprises at a higher level, which for economic reasons cannot exist in the rural centre, such as secondary schools, a hospital or central clinic, larger factories, and the like. The size of the urban centre and its institutions is determined by the number of rural communities and families it serves. Such a triple-layer regional structure serves in Israel as a general model for comprehensive planning, not only for new settlement areas but also for settled regions in need of agrarian reform and a new

impetus for development.

Planning and implementation

Agricultural planning is concerned with a dynamic process and thus cannot be separated from the executive level. Moreover, the process of implementation must constantly be brought to bear on the theory of planning. Four interrelated and mutually inter-acting phases may thus be distinguished in agricultural and rural development:

(a) The objectives of the development effort must be determined and clearly formulated, whether they be purely economic, socio-political, financial or of a composite nature.

(b) Planning proper, i.e. the survey of basic data required to assess the development of the basic factors affecting micro- and macro-planning, laying dow.. a policy capable of channelling such factors to the predetermined goal, and finally, the study of the interrelation between both systems and the drawing of inferences as to the comprehensive development of the rural areas from the numerous aspects reviewed.

(c) Preparation of the execution stage or the implementation stage, i.e. preparing the organisation, the means and the rules by which the developing authority will put the plan into practice.

(c) Follow-up of the execution stage, i.e. drawing current and systematic conclusions in the course of development, by which to test the goals set and the aptness of the plan. Such follow-up may lead the developing authority to alter its objectives or its plan, or various stages of it, and hence the need for such a built-in feed-back mechanism at all stages andlevels of the development process and hierarchy.

Planning should therefore be regarded as a dynamic process, closely associated with implementation until the full achievement of the final objectives. This leads to far-reaching conclusions regarding the organisation of the bodies dealing with rural and agricultural development and the link between policy-makers, planners, professional men and executives. Experience in Israel has shown that these ties must be close and constant, not only at the higher levels of the hierarchy, but through all grades down to the regional offices which are in daily contact with those for whom the development plan is designed. We shall cite here only three main conclusions from the large number arrived at:

1. A non-centralised organisation is preferable to a centralised structure of the development authority, so that even the lowest ranks of the hierarchy may be free in shaping their day-to-day work.

2. The development teams must include all the necessary professions: economists, sociologists, agricultural scientists and organisers. Each team should be headed by a policy-maker, well-versed in comppehensive rural planning, with practical and theoretical training in this field, and endowed with an overall point of view, who is capable of allocating the proper role to each profession. Such comprehensive planners are newcomers to the agricultural development scene, and have

grown from an empiric study of requirements. The time has come to introduce special courses at universities for preparing such team leaders.

3. The development team is not merely called upon to direct and coordinate planning activities. It must also undertake the active leadership of the region under its guidance, so as to bring its influence to bear on those for whom the development programme has been devised. In order to carry out its work faithfully the team must not only live and become integrated within the development area, but must also evolve suitable methods of training and instruction easily understandable to the rural population in question. Much further study and applied research is required in this respect, for experience in Israel has proved the decisive importance of such collaboration regarding the results of the development effort.

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**SUMMARY**

Agenda Item : H.1 and H.2

Israel

# AGRICULTURAL AND RURAL PLANNING : ITS ORGANIZATION AND IMPLEMENTATION

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Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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# AGRICULTURAL AND RURAL PLANNING: ITS ORGANIZATION AND IMPLEMENTATION

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## SUMMARY

Dynamic changes are taking place in agriculture, not only in the developed, but perhaps mainly in the developing countries. The much-desired rise in the standard of living can be achieved through industrial development and increased efficiency of agriculture. Yet experience has shown these frequently to result in the abandonment of the rural areas and the creation of a rootless city proletariat. In conventional agricultural planning on a national scale a discrepancy has been encountered between national objectives and the effective possibilities of the farmer, while the free interplay of the free market can no longer serve as sole regulator. A new approach to agricultural and rural planning is thus sorely needed.

A comprehensive planning method has been conceived in Israel, based on the principle that government policy should aim at providing such conditions where the national production aimed at would also be worth while to the farmer and the traditional stability of the rural population would not be undermined. This approach is sub-divided into three systems of interrelated factors: (1) macro-planning: the optimal distribution of the means of production among the different branches of agriculture; (2) micro-planning: the distribution of the means of production among the different farmers; (3) the relationship between town and country, i.e. the appropriate integration between agriculture, industry and services in the rural areas. All these are to be studied and evaluated not only from from the economic viewpoint but also from the social, institutional, organisational, political and environmental aspect whose mutual interrelation should be thoroughly understood. Throughout, the human factor must be stressed, since it is of prime importance particularly in agriculture, where initiative is required of the farmer, which is not required of the ordinary industrial worker.

In the field of micro-planning the yardstick chosen in Israel is the coefficient of the net income of the farm as related to the projected rise in the national per capita income. This yardstick, much better than any physical measurement of means of production (land, water, climate) enables the planner to achieve a fair distribution of the means of production between town and country and among the individual farmers.

Within the third system it has been found useful to integrate certain industries in agricultural development, thus providing an alternative source of livelihood for surplus manpower and temporarily idle farmers and preventing them from

leaving the rural communities. Examples of specific solutions for particularly problematic rural areas in Israel are given. In order to prevent the depletion of the rural areas it is further suggested that rural communities be organised round rural centres where educational, medical and economic services are available. A triple-layered structure of villages, composite rural communities and "development regions" containing each a town centre, is thus proposed.

Special stress is laid on the close interrelation between the planning and implementation in rural and agricultural planning. It is suggested that a "feedback" mechanism be provided in the structure of the development authority, so that wherever necessary plans and objectives may be altered in the light of circumstances as they arise.

A non-centralised structure is proposed for the development authority so that it may remain flexible in its decision and in immediate touch with the population for whom the development programme is intended. Special all-round teams of professionals headed by a policy-maker versed in the comprehensive planning approach are described, which by living close to the community for whom the development plan is designed have a decisive effect on the success of the plan.



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